Integrating with JBoss Enterprise Application Platform

Installing the ActiveMQ resource adapter into the JBoss Enterprise Application Platform container
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JBoss A-MQ Docs Team
Content Services
fuse-docs-support@redhat.com
Abstract

This guide describes how to the ActiveMQ resource adapter into a JBoss Enterprise Application Platform and how to run an example with Message Driven Beans.
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CHAPTER 1. DEPLOYING THE APACHE ACTIVEMQ RESOURCE ADAPTER

Abstract
This chapter explains how to install the Apache ActiveMQ resource adapter into JBoss Enterprise Application Platform and how to integrate ActiveMQ messaging into your applications, taking the helloworld-mdb demonstration as an example.

1.1. SUPPORTED WEB SERVER PLATFORMS

Overview
The following Web server platforms are supported by JBoss A-MQ 6.1:

- JBoss Enterprise Application Platform (JBoss EAP)

Supported product versions
To see which versions of JBoss EAP are supported with JBoss A-MQ 6.1, please consult the JBoss A-MQ 6.1 Supported Configurations page.

NOTE
AMQP 1.0 is not a supported protocol for the JBoss A-MQ JCA connector (Apache ActiveMQ resource adapter). OpenWire is the only wire protocol supported by the JCA connector / resource adapter.

1.2. INSTALL THE ACTIVEMQ RESOURCE ADAPTER

Overview
This section describes how to find, install, and configure the ActiveMQ resource adapter into a standalone instance of the JBoss Enterprise Application Platform.

A resource adapter is a kind of plug-in for a J2EE container. The J2EE standard defines the resource adapter framework, which makes it possible to expand the core J2EE container, adding new features and functionality. By installing the ActiveMQ resource adapter, you make it possible for message driven beans and servlets to communicate through an external JBoss A-MQ broker instance. The JBoss A-MQ broker can thus be used as the underlying messaging system in the container.

Resource adapter location
You can find the ActiveMQ resource adapter archive file, activemq-rar-5.9.0.redhat-610379.rar, at either of the following locations:

- In the following Zip archive file:
  
    InstallDir/extras/apache-activemq-5.9.0.redhat-610379-bin.zip
After expanding the archive, the resource adapter file can be found in the following sub-directory:

- `apache-activemq-5.9.0.redhat-610379/lib/optional`

- Directly from the Red Hat JBoss Fuse Maven repository, at the following URL:
  
  `http://repo.fusesource.com/nexus/content/groups/public/org/apache/activemq/activemq-rar/`

Download the `.rar` archive file from the appropriately versioned sub-directory, 5.9.0.redhat-610379.

### Configuration files

The following configuration files are needed for the ActiveMQ resource adapter (when installed in a standalone instance of the JBoss Enterprise Application Platform):

**InstallDir/standalone/configuration/standalone.xml**

The `standalone.xml` file is the default (bare bones) configuration for the JBoss Enterprise Application Platform container. You must edit this file to complete the installation of the ActiveMQ resource adapter.

**NOTE**

It is assumed that this file does **not** already configure the HornetQ messaging system (which would conflict with the ActiveMQ messaging system).

**NOTE**

JBoss Enterprise Application Platform can be figured either as a standalone container, using `standalone/configuration/standalone.xml`, or as a managed domain, using `domain/configuration/domain.xml`. Throughout this section, we describe explicitly how to configure the standalone container, but it is understood that a similar approach could be used to configure a managed domain.

### Steps to install the resource adapter

Perform the following steps to install the Apache ActiveMQ resource adapter into JBoss Enterprise Application Platform (assuming that you will be running the container in standalone mode):

1. Extract the Apache ActiveMQ community distribution. You can find an archive of the Apache ActiveMQ distribution in the following location:

   **InstallDir/ extras/ apache-activemq-5.9.0.redhat-610379-bin.zip**

   Using a suitable archive utility, extract the preceding archive file to any convenient location on your filesystem. The root of the extracted directory tree is called `apache-activemq-5.9.0.redhat-610379` by default.

2. The ActiveMQ resource adapter archive file can now be found under the `/lib/optional` subdirectory of the archive extracted in the previous step. Make a copy of the ActiveMQ resource
adapter archive file, omitting the version number in the filename. For example, on a UNIX or Linux platform, you can rename the `activemq-rar-5.9.0.redhat-610379.rar` archive file as follows:

```bash
cd apache-activemq-5.9.0.redhat-610379/lib/optional
cp activemq-rar-5.9.0.redhat-610379.rar activemq-rar.rar
```

**NOTE**

Renaming the resource adapter archive in this way is not strictly necessary. But because the resource adapter file name appears in the resource adapter configuration, using a versionless filename makes it easier to upgrade the resource adapter at a later date.

3. Install the ActiveMQ resource adapter by copying the resource adapter archive, `activemq-rar.rar`, to the relevant JBoss Enterprise Application Platform deployment directory. For example, on a UNIX or Linux platform, you could copy the resource adapter archive to a standalone JBoss Enterprise Application Platform as follows:

```bash
cp activemq-rar.rar EAPInstallDir/standalone/deployments/
```

4. Add the requisite resource adapter configuration to the `urn:jboss:domain:resource-adapters:1.1` subsystem in the JBoss Enterprise Application Platform configuration, as follows.

Open the `EAPInstallDir/standalone/configuration/standalone.xml` file using a text editor and paste the `resource-adapter` element from Example 1.1, "ActiveMQ Resource Adapter Configuration in standalone.xml" into the `urn:jboss:domain:resource-adapters:1.1` subsystem, as a child of the `resource-adapters` element.

---

**Example 1.1. ActiveMQ Resource Adapter Configuration in standalone.xml**

```xml
<server xmlns="urn:jboss:domain:1.4">
  ...
  <profile>
    ...
    <subsystem xmlns="urn:jboss:domain:resource-adapters:1.1">
      <resource-adapters>
        <resource-adapter id="activemq-rar.rar">
          <archive>activemq-rar.rar</archive>
          <transaction-support>XATransaction</transaction-support>
          <config-property name="UserName">defaultUser</config-property>
          <config-property name="Password">defaultPassword</config-property>
          <config-property name="ServerUrl">tcp://localhost:61616?</config-property>
        </resource-adapter>
      </resource-adapters>
    </subsystem>
  </profile>
</server>
```
jms.rmIdFromConnectionId=true
  </config-property>
<connection-definitions>
  <connection-definition
    class-name="org.apache.activemq.ra.ActiveMQManagedConnectionFactory"
    jndi-name="java:/ConnectionFactory"
    enabled="true"
    pool-name="ConnectionFactory">
    <xa-pool>
      <min-pool-size>1</min-pool-size>
      <max-pool-size>20</max-pool-size>
      <prefill>false</prefill>
      <is-same-rm-override>false</is-
same-rm-override>
    </xa-pool>
    <recovery>
      <recover-credential>
        <user-name>defaultUser</user-name>
        <password>defaultPassword</password>
      </recover-credential>
    </recovery>
  </connection-definition>
</connection-definitions>
<admin-objects>
  <admin-object
    class-name="org.apache.activemq.command.ActiveMQQueue"
    jndi-name="java:/queue/HELLOWORLDMDBQueue"
    use-java-context="true"
    pool-name="HELLOWORLDMDBQueue">
    <config-property
      name="PhysicalName">
      HELLOWORLDMDBQueue
    </config-property>
  </admin-object>
  <admin-object
    class-name="org.apache.activemq.command.ActiveMQTopic"
    jndi-name="java:/topic/HELLOWORLDMDBTopic"
    use-java-context="true"
    pool-name="HELLOWORLDMDBTopic">
    <config-property
      name="PhysicalName">
      HELLOWORLDMDBTopic
    </config-property>
  </admin-object>
</admin-objects>
</resource-adapter>
If your resource adapter archive filename differs from `activemq-rar.rar`, you must change the content of the `archive` element in the preceding configuration to match the name of your archive file.

The values of the `UserName` and `Password` configuration properties must be chosen to match the credentials of a valid user in the external broker.

You might need to change the value of the `ServerUrl` configuration property to match the actual hostname and port exposed by the external broker.

**IMPORTANT**

In order to ensure that JMS transactions are integrated correctly, it is essential to include the `jms.rmIdFromConnectionId=true` option setting on the `ServerUrl` configuration property and to include the `<is-same-rm-override>false</is-same-rm-override>` setting in the `xa-pool` element, as shown above.

**NOTE**

The JMS administrative objects defined in the `admin-objects` element do not need to be defined yet. They serve as examples to show how you can define administrative objects for the ActiveMQ resource adapter (they are used later in the message-driven bean demonstration).

5. Add the requisite message driven bean configuration to the `urn:jboss:domain:ejb3:1.4` subsystem in the JBoss Enterprise Application Platform configuration.

Open the `EAPInstallDir/standalone/configuration/standalone.xml` file using a text editor and paste the `mdb` element from Example 1.2, “Message Driven Bean Configuration in standalone.xml” into the `urn:jboss:domain:ejb3:1.4` subsystem.

**Example 1.2. Message Driven Bean Configuration in standalone.xml**

```
<server xmlns="urn:jboss:domain:1.4">
    ...
    <profile>
        ...
        <subsystem xmlns="urn:jboss:domain:ejb3:1.4">
            ...
            <mdb>
                <resource-adaptor-ref resource-adaptor-name="activemq-rar.rar"/>
                <bean-instance-pool-ref pool-name="mdb-strict-max-pool"/>
            </mdb>
        </subsystem>
    </profile>
</server>
```
6. Before starting the broker, check the broker configuration to make sure that there are valid user credentials defined in the broker's `InstallDir/etc/users.properties` file. For example, to match the `UserName` and `Password` credentials configured in Example 1.1, “ActiveMQ Resource Adapter Configuration in standalone.xml”, the `users.properties` file should contain an entry like the following:

```properties
defaultUser=defaultPassword,admin
```

7. Start the external A-MQ broker. For example, on a UNIX or Linux platform, you can start the JBoss A-MQ broker instance as follows:

```bash
cd InstallDir/bin
./amq
```

8. Start the standalone instance of JBoss Enterprise Application Platform. For example, on a UNIX or Linux platform, you can start the standalone instance as follows:

```bash
cd EAPInstallDir/bin
./standalone.sh
```

**Resource adapter configuration**

In the configuration shown in Example 1.1, “ActiveMQ Resource Adapter Configuration in standalone.xml”, you use the `config-property` element to set resource adapter properties. The ActiveMQ resource adapter supports the following basic properties:

**UserName**

*(Optional)* Specifies the client username when connecting to the JBoss A-MQ broker (not required in this example, because the JBoss A-MQ broker configuration does not enable authentication).

**Password**

*(Optional)* Specifies the client password when connecting to the JBoss A-MQ broker (not required in this example, because the JBoss A-MQ broker configuration does not enable authentication).
ServerUrl

Specifies the URL used to connect to the JBoss A-MQ broker instance. This value must match one of the endpoints specified by a transportConnector element in the JBoss A-MQ broker configuration.

BrokerXmlConfig

(Optional) Specifies the location of an embedded broker's XML configuration file. To specify a location on the file system, use the format, xbean:file://AbsolutePath, where the path, AbsolutePath, should be specified as an absolute pathname.

UseInboundSession

(Optional) Sets a flag that specifies whether outbound connections should reuse the inbound connection's session for sending messages (useful for connections going through a firewall). Defaults to false.

Clientid

(Optional) Specifies a JMS client ID, which the resource adapter uses for the connection from the JBoss Enterprise Application Platform container.

JBoss A-MQ broker configuration

Most of the options for customizing the ActiveMQ resource adapter are provided by the JBoss A-MQ broker configuration file, at the following location:

```
InstallDir/etc/activemq.xml
```

This configuration file supports a huge range of features and settings which are beyond the scope of this guide. To learn more about JBoss A-MQ broker configuration, see the following guides from the Red Hat JBoss A-MQ documentation library:

- Configuring Broker Persistence
- Tuning Guide
- Security Guide
- XML Configuration Reference

1.3. INTEGRATING WITH AN ACTIVEMQ FAILOVER CLUSTER

Overview

This section describes how to configure the ActiveMQ resource adapter to connect to an ActiveMQ failover cluster (for example, a high-availability master/slave cluster). For details about how to set up and configure such a cluster, see "Fault Tolerant Messaging".

Failover URL
To connect to a cluster of JBoss A-MQ brokers (for example, a master/slave pair of brokers), you need to configure the **ServerUrl** configuration property with a failover URL, which lists the available endpoints in the cluster. The general form of the failover URL you should use is as follows:

```java
failover:(uri1,...,uriN)?maxReconnectAttempts=0
```

**NOTE**

It is important to set the option **maxReconnectAttempts=0**, in order to ensure a clean cutover when the master fails in a master/slave high-availability cluster.

**Sample scenario**

Consider the scenario where a broker running on host **amqhostA** and a broker running on host **amqhostB** are configured to run as a high-availability master/slave cluster. In this scenario, the brokers expose the following TCP endpoints:

```text
tcp://amqhostA:61616
tcp://amqhostB:61616
```

To connect to this cluster, the resource adapter should be configured with the following failover URL:

```java
failover:(tcp://amqhostA:61616,tcp://amqhostB:61616)?
  jms.rmIdFromConnectionId=true&maxReconnectAttempts=0
```

When setting the URL in an XML file, you must remember to escape the & symbol as &amp; giving the URL:

```java
failover:(tcp://amqhostA:61616,tcp://amqhostB:61616)?
  jms.rmIdFromConnectionId=true&amp;maxReconnectAttempts=0
```

**Configuring the ActiveMQ resource adapter for failover**

To configure the ActiveMQ resource adapter to connect to an ActiveMQ failover cluster, you must modify the following configuration settings:

- Set the **ServerUrl** configuration property to a correctly configured failover URL,
- Set the **UseInboundSession** configuration property to **true** for inbound connections (set as the direct child of the **resource-adapter** element), and
- Set the **UseInboundSession** configuration property to **false** for the connection factories (set as the child of a **connection-definition** element).

Open the `EAPInstallDir/standalone/configuration/standalone.xml` file using a text editor, search for the `urn:jboss:domain:resource-adapters:1.1` subsystem, and modify the **ServerUrl** property and the **UseInboundSession** property as shown in Example 1.3, “ActiveMQ Resource Adapter Configuration for Failover”. You will need to customize the value of the failover URL, as appropriate, to match the configuration of your broker cluster.

**Example 1.3. ActiveMQ Resource Adapter Configuration for Failover**
1.4. INSTALL JBOSS AS QUICKSTARTS

Overview

The JBoss AS Quickstart examples consists of a collection of demonstrations that illustrate features of the JBoss Enterprise Application Platform. The installation consists of the following parts:

- **JBoss EAP Maven repository**—an offline Maven repository for JBoss Enterprise Application Platform, which contains the dependencies required by the quickstart examples.

- **JBoss AS Quickstart examples**—the quickstart examples themselves.

Prerequisites

To download, install, and build the JBoss AS Quickstart examples, you need the following prerequisites:
Subscription—you must have a Red Hat subscription that includes support for the JBoss Enterprise Application Platform product (or ask Red Hat support for access as part of an evaluation).

Maven installation—you must have Apache Maven installed and the version must be 3.0.0 or later. You can get the latest copy of Maven from the Maven download page.

Internet access—Maven is a distributed build system, which downloads packages from the Internet on the fly, whenever they are needed during a build. Consequently, you must have access to the Internet while performing a Maven build.

**JBoss AS Quickstarts download location**

You can download the JBoss AS Quickstart examples from the Quickstarts download page on the Red Hat Customer Portal site. Click the following link to download the `jboss-eap-6.1.0-quickstarts.zip` file:

- JBoss Enterprise Application Platform 6.1.0 Quickstarts

**NOTE**

After following this link, you will be prompted to log on to the Red Hat customer access portal. If you do not have a subscription for JBoss Enterprise Application Platform, you will not be able to access this download, however.

**Maven repository download location**

The JBoss Enterprise Application Platform Maven repository is required in order to run the quickstart examples.

You can download the Maven repository from the Maven Repository download page on the Red Hat Customer Portal site. Click the following link to download the `jboss-eap-6.1.0-maven-repository.zip` file:

- JBoss Enterprise Application Platform 6.1.0 Maven Repository

**Steps to install JBoss AS Quickstarts**

To install the JBoss AS Quickstart examples, perform the following steps:

1. Download the `jboss-eap-6.1.0-quickstarts.zip` file from the customer portal site. Use an archive utility to unzip the downloaded file at a convenient location on your filesystem, `QuickInstallDir`.

2. Download the `jboss-eap-6.1.0-maven-repository.zip` file from the customer portal site. Use an archive utility to unzip the downloaded file at a convenient location on your filesystem, `MvnRepoInstallDir`.

**NOTE**

It is essential to download and install the Maven repository on your local machine. The quickstart examples require Maven artifacts that are not available from any public repositories online. You will not be able to build the quickstart examples unless you download, install, and configure the Maven repository.
3. Configure Maven to use the downloaded Maven repository by editing your local repository's `settings.xml` file (usually located at `~/.m2/settings.xml` on Linux and UNIX systems, or at `C:\Documents and Settings\Username\.m2\settings.xml` on Windows). Open the `settings.xml` file with a text editor and add the following profiles:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<settings xmlns="http://maven.apache.org/SETTINGS/1.0.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/SETTINGS/1.0.0
  http://maven.apache.org/xsd/settings-1.0.0.xsd">
  <profiles>
    <!-- Configure the JBoss EAP Maven repository -->
    <profile>
      <id>jboss-eap-repository</id>
      <repositories>
        <repository>
          <id>jboss-eap-repository</id>
          <url>file://path/to/jboss-eap-6.1.0.GA-maven-repository</url>
          <releases>
            <enabled>true</enabled>
          </releases>
          <snapshots>
            <enabled>false</enabled>
          </snapshots>
        </repository>
      </repositories>
      <pluginRepositories>
        <pluginRepository>
          <id>jboss-eap-plugin-repository</id>
          <url>file://path/to/jboss-eap-6.1.0.GA-maven-repository</url>
          <releases>
            <enabled>true</enabled>
          </releases>
          <snapshots>
            <enabled>false</enabled>
          </snapshots>
        </pluginRepository>
      </pluginRepositories>
    </profile>
    <!-- Configure the JBoss Community Maven repository -->
    <profile>
      <id>jboss-community-repository</id>
      <repositories>
        <repository>
          <id>jboss-community-repository</id>
          <url>http://repository.jboss.org/nexus/content/groups/public/</url>
          <releases>
            <enabled>true</enabled>
          </releases>
          <snapshots>
            <enabled>false</enabled>
          </snapshots>
        </repository>
      </repositories>
    </profile>
  </profiles>
</settings>
```
Alternatively, there is a sample settings file provided at MvnRepoInstallDir/example-settings.xml in the downloaded Maven repository, which you can use as a template for defining your settings.xml file.

4. Replace all occurrences of file:///path/to/jboss-eap-6.1.0.GA-maven-repository in the settings.xml file with the actual location of the Maven repository on your filesystem, MvnRepoInstallDir.

Test the installation

To test the installation of the quickstart examples, try to build the helloworld-mdb example using Maven. Open a new command window, change directory to QuickInstallDir/helloworld-mdb, and enter the following command:

```bash
mvn clean package
```

If the project builds successfully, you should see a BUILD SUCCESS status and the generated jboss-as-helloworld-mdb.war package will be found under the QuickInstallDir/target directory.

If the project does not build successfully, make sure that you have access to the Internet and check that the Maven settings.xml file is correctly configured.
1.5. BUILD AND DEPLOY THE HELLOWORLD-MDB EXAMPLE

Overview
In this tutorial, you will customize the helloworld-mdb quickstart example so that it works with the ActiveMQ resource adapter. You can then build and deploy the helloworld-mdb example into a standalone instance of JBoss Enterprise Application Platform (which already has an ActiveMQ resource adapter installed).

The helloworld-mdb example illustrates two kinds of integration with messaging: integration of message-driven beans; and integration of a servlet (which gets access to a JMS queue and a JMS topic using the standard JMS administered objects mechanism).

Prerequisites
The following prerequisites must be satisfied, before you can build and deploy the helloworld-mdb example:

- The ActiveMQ resource adapter is installed in the JBoss Enterprise Application Platform (as described in Section 1.2, “Install the ActiveMQ Resource Adapter”), and the installation has been verified.
- The JBoss EAP Maven repository and the JBoss AS Quickstart examples have been installed (as described in Section 1.4, “Install JBoss AS Quickstarts”).
- You have Internet access (for the Maven build).

Customizations
The version of the helloworld-mdb demonstration provided in the quickstarts distribution is integrated with the HornetQ messaging platform by default. To refactor the demonstration so that it integrates with Apache ActiveMQ, it is necessary to customize the following aspects of the helloworld-mdb code:

- Delete the HornetQ XML configuration file (located in helloworld-mdb/src/webapp/WEB-INF/hornetq-jms.xml).
- In HelloWorldQueueMDB.java, customize the annotations on the message driven bean to integrate with the ActiveMQ resource adapter.
- In HelloWorldTopicMDB.java, customize the annotations on the message driven bean to integrate with the ActiveMQ resource adapter.
- Add additional Maven dependencies.

These customizations are described in more detail in the rest of this section.

Steps to build and deploy the example
To build and deploy the quickstart helloworld-mdb example, perform the following steps:

1. Delete the following HornetQ XML configuration file from the helloworld-mdb project:

   helloworld-mdb/src/webapp/WEB-INF/hornetq-jms.xml
2. Edit the annotations on the **HelloWorldQueueMDB** message driven bean class, so that it integrates with the ActiveMQ resource adapter (instead of HornetQ). Edit the **HelloWorldQueueMDB.java** file at the following location:

```java
helloworld-mdb/src/main/java/org/jboss/as/quickstarts/mdb/HelloWorldQueueMDB.java
```

Open the **HelloWorldQueueMDB.java** file using a text editor and make the modifications highlighted in the following extract:

```java
import org.jboss.ejb3.annotation.ResourceAdapter;
...
@MessageDriven(name = "HelloWorldQueueMDB", activationConfig = {
    @ActivationConfigProperty(propertyName = "destinationType",
    propertyValue = "javax.jms.Queue"),
    @ActivationConfigProperty(propertyName = "destination",
    propertyValue = "HELLOWORLDMDBQueue"),
    @ActivationConfigProperty(propertyName = "acknowledgeMode",
    propertyValue = "Auto-acknowledge")
})
@ResourceAdapter(value="activemq-rar.rar")
public class HelloWorldQueueMDB implements MessageListener {
...
```

Where the following changes are made to the code:

- The **@ResourceAdapter** annotation explicitly associates the message driven bean with the ActiveMQ resource adapter. You *must* include this annotation, if you want to use the ActiveMQ resource adapter.

- You need to add an **import** statement for the **@ResourceAdapter** annotation.

- The value of the **destination** property is changed to **HELLOWORLDMDBQueue**, which is the *physical name* of the corresponding ActiveMQ queue that this message driven bean subscribes to. The physical name of the queue is the queue identifier used by the JBoss A-MQ broker.

**NOTE**

You must specify the queue’s physical name here. In contrast to the case of HornetQ, the ActiveMQ messaging integration does *not* allow you to use a JNDI name for the **destination** value.

3. Edit the annotations on the **HelloWorldTopicMDB** message driven bean class, so that it integrates with the ActiveMQ resource adapter (instead of HornetQ). Edit the **HelloWorldTopicMDB.java** file at the following location:

```java
helloworld-mdb/src/main/java/org/jboss/as/quickstarts/mdb/HelloWorldTopicMDB.java
```

Open the **HelloWorldTopicMDB.java** file using a text editor and make the modifications highlighted in the following extract:
import org.jboss.ejb3.annotation.ResourceAdapter;
...
@ResourceAdapter(value="activemq-rar.rar")
public class HelloWorldTopicMDB implements MessageListener {
...
6. If you have not already done so, register the administered objects for the queues and topics used by the example, by editing the JBoss Enterprise Application Platform configuration.

In your JBoss Enterprise Application Platform installation, open the `standalone/configuration/standalone.xml` configuration file with a text editor, and add the following highlighted administered objects to the `activemq-rar.rar` resource adapter:

```xml
<server xmlns="urn:jboss:domain:1.4">
  ...
  <profile>
    ...
    <subsystem xmlns="urn:jboss:domain:resource-adapters:1.1">
      <resource-adapters>
        <resource-adapter id="activemq-rar.rar">
          ...
          <admin-objects>
            <admin-object
              class-name="org.apache.activemq.command.ActiveMQQueue"
              jndi-name="java:/queue/HELLOWORLDMDBQueue"
              use-java-context="true"
              pool-name="HELLOWORLDMDBQueue">
              <config-property name="PhysicalName">
                HELLOWORLDMDBQueue
              </config-property>
            </admin-object>
            <admin-object
              class-name="org.apache.activemq.command.ActiveMQTopic"
              jndi-name="java:/topic/HELLOWORLDMDBTopic"
              use-java-context="true"
              pool-name="HELLOWORLDMDBTopic">
              <config-property name="PhysicalName">
                HELLOWORLDMDBTopic
              </config-property>
            </admin-object>
          </admin-objects>
        </resource-adapter>
      </resource-adapters>
    </subsystem>
  ...
  </profile>
  ...
</server>
```

Where the preceding configuration adds the following entries to the JNDI registry:

**java:/queue/HELLOWORLDMDBQueue**

References a `javax.jms.Queue` object that connects to the `HELLOWORLDMDBQueue` ActiveMQ queue (where the queue name on the JBoss A-MQ broker is specified by the `PhysicalName` config property).

**java:/queue/HELLOWORLDMDBTopic**
References a `javax.jms.Topic` object that connects to the `HELLOWORLDMDBTopic` ActiveMQ topic (where the topic name on the JBoss A-MQ broker is specified by the `PhysicalName` config property).

In the `helloworld-mdb` example, these administered objects are accessed by the servlet class, `HelloWorldMDBServletClient` (but not by the message driven bean classes). For example, the `HelloWorldMDBServletClient` class injects these JNDI entries, using the `@Resource` annotation, as follows:

```java
import javax.annotation.Resource;
...
import javax.jms.ConnectionFactory;
...
import javax.jms.Queue;
import javax.jms.Topic;
...
public class HelloWorldMDBServletClient extends HttpServlet {
    ...
    @Resource(mappedName = "java:/ConnectionFactory")
    private ConnectionFactory connectionFactory;
    
    @Resource(mappedName = "java:/queue/HELLOWORLDMDBQueue")
    private Queue queue;
    
    @Resource(mappedName = "java:/topic/HELLOWORLDMDBTopic")
    private Topic topic;
    ...
```

7. Deploy the `helloworld-mdb` example to the running Web server. Manually copy the `jboss-as-helloworld-mdb.war` WAR file from the `helloworld-mdb/target` directory to the Web server's deployment directory, `standalone/deployments`.

### Access the helloworld-mdb service

You can now test the `helloworld-mdb` service, as follows:

1. If you have not already started the JBoss Enterprise Application Platform standalone container, do so by entering the following commands at the command line:

   ```bash
   cd EAPInstallDir/bin
   ./standalone.sh
   ```

2. You should now be able to access the `helloworld-mdb` service from your browser, by navigating to the following URL:

   ```text
   http://localhost:8080/jboss-as-helloworld-mdb/HelloWorldMDBServletClient
   ```

When you navigate to the preceding URL, the servlet sends five messages to the `HelloWorldQueueMDB` message-driven bean. If you look at the container console window, you should see some output like the following:
These console messages are written by the `HelloWorldQueueMDB` message-driven bean, thus demonstrating that the messages have successfully propagated from the servlet, through the JBoss A-MQ broker, to the message-driven bean.

3. To send messages to the `HelloWorldTopicMDB` message-driven bean, navigate to the following URL:

```
```

When you navigate to the preceding URL, the servlet sends five messages to the `HelloWorldTopicMDB` message-driven bean. If you look at the container console window, you should see some output like the following:

```
14:53:02,464 INFO [class org.jboss.as.quickstarts.mdb.HelloWorldTopicMDB] (default-threads - 9) Received Message from topic: This is message 2
14:53:02,466 INFO [class org.jboss.as.quickstarts.mdb.HelloWorldTopicMDB] (default-threads - 10) Received Message from topic: This is message 3
14:53:02,468 INFO [class org.jboss.as.quickstarts.mdb.HelloWorldTopicMDB] (default-threads - 8) Received Message from topic: This is message 1
14:53:02,471 INFO [class org.jboss.as.quickstarts.mdb.HelloWorldTopicMDB] (default-threads - 11) Received Message from topic: This is message 4
14:53:02,472 INFO [class org.jboss.as.quickstarts.mdb.HelloWorldTopicMDB] (default-threads - 12) Received Message from topic: This is message 5
```

These console messages are written by the `HelloWorldTopicMDB` message-driven bean, thus demonstrating that the messages have successfully propagated from the servlet, through the JBoss A-MQ broker, to the message-driven bean.